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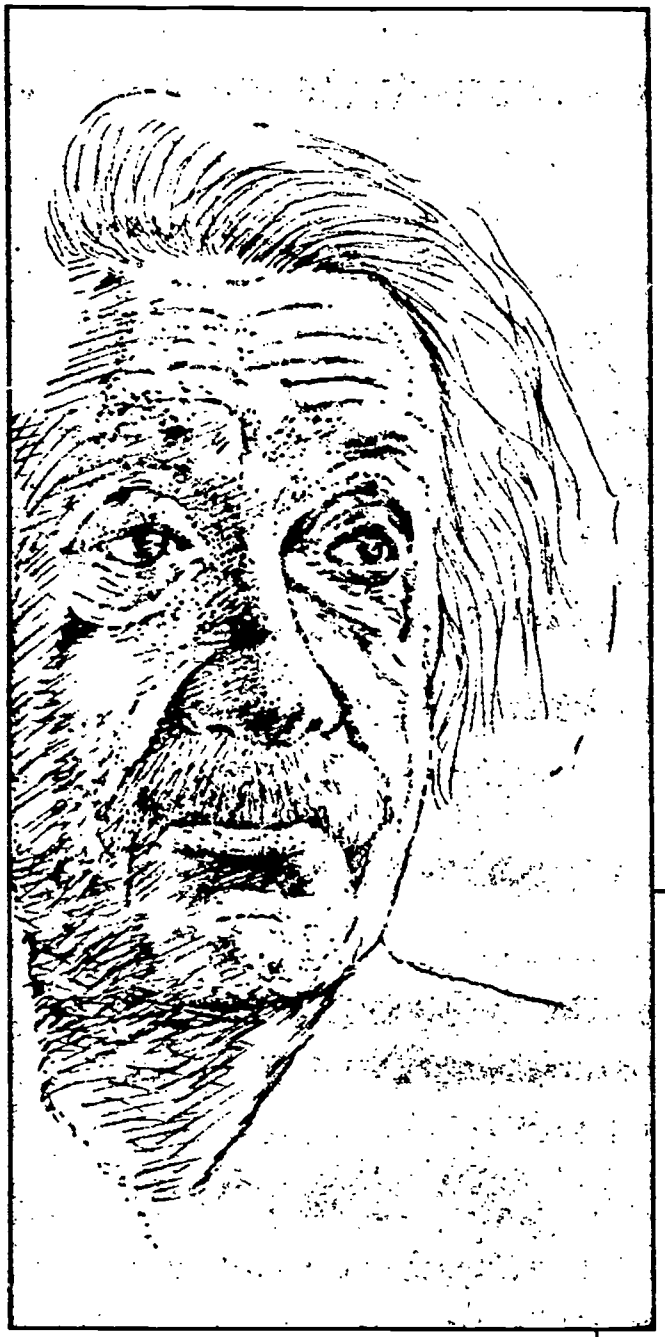
ABSTRACT

The University of California San Francisco's Medical Scholars Program was designed to encourage women and minority students to consider careers in academic medicine. The program ensured academic success in the basic pre-medical courses through the use of peer learning groups and exposed students to research opportunities through informal discussion and summer research participation. The program operated for 3 years and served 93 white students (29% of those entering in that period) and 71 non-white students (70% of those entering in that period). During the program the number of minority students participating in summer research doubled; minority failures in pre-clinical courses declined; and the impact of pre-medical school achievement on the National Board of Medical Examiners Part 1 ceased to be a significant predictor of students' actual scores. The program also appeared to have a school-wide effect in increasing the use of group study, in decreasing the onus on "help-seeking," and in promoting consideration of academic careers. Finally, the program created an infrastructure of medical student teachers who serve as a peer support group to first-year students. The report's three sections include a quantitative analysis of the program and its effect on student performance on the National Board Examination, a summative qualitative analysis based on student interviews, and a description of summer research experiences. (JB)



"Small is the number of them that see with their own eyes and feel with their own hearts."

Albert Einstein

UCSF Medical Scholars Program, 1986-1987

UCSF Medical Scholars Program

Grantee Organization:

UCSF School of Medicine
Office of Curricular and Student Affairs
San Francisco, CA 94143

Grant No.:

G008642191

Project Dates:

Starting Date: October 1, 1986
Ending Date: September 30, 1989
Number of Months: 36

Project Director:

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FIPSE Program Officer:

Jay Donahue

Grant Award:

Year 1: $23,483
Year 2: $37,153
Year 3: $42,718

Introduction

The UCSF Medical Scholars Program was designed to encourage women and minority students to consider careers in academic medicine. The proposed strategy was: 1) to ensure academic success in the basic pre-medical courses through the use of peer learning groups; and 2) to expose students to research opportunities through informal discussion and summer research participation.

In its three years of operation, the program served first-year medical students, including 93 white students (29% of those entering in that period) and 71 of the non-white students (70% of those entering in that period). During the three years of the program's operation, the number of minority students participating in summer research doubled; minority failures in pre-clinical courses declined; and the impact of pre-medical school (college) achievement on the National Board of Medical Examiners Part I ceased to be a significant predictor of students' actual scores on the examination.

MSP appeared to have a school-wide effect in increasing the use of group study, in decreasing the onus on "help-seeking", and in promoting consideration of academic careers. Finally, the program created an infra-structure of medical student teachers who serve as a peer support group to the first-year students.

Current Status of the Project and Plans for Dissemination

The project, initally funded by FIPSE, is now supported with funds from the Dean's Office. This year (1989-90) the program served approximately 100 first-year students (71% of the first-year class) in its anatomy workshop. We have received a dissemination grant from FIPSE to prepare a collection of the worksheets that are used in our peer learning groups. These books will be distributed free-of-charge to medical schools around the country. Finally, when the data analysis is completed, we will prepare an article for publication in an educational journal.

Sections of the Report

This report is divided into three sections. The first section is a quantitative analysis of the program that reviews findings from an extensive data base maintained on students entering UCSF School of Medicine between the years of 1983 and 1988. This section of the report

was prepared by the project director, Mindy Fullilove, with statistical consultation from Robert Fullilove and Maira Benjamin.
this first section examines the effect of MSP on student performance on the National Board Examination.

The second section of the report is the summative qualitative analysis of the program, prepared by Rose Asera, an educational consultant to MSP, who interviewed students in all three of the classes participating in MSP. The qualitative evaluation was designed to investigate the opinions, attitudes and experiences of students, workshop leaders and faculty who had contact with MSP.

The third section of the report, also prepared by Rose Asera, describes experiences in summer research and other projects. Broadening minority student participation in summer research was an integral part of the activities of MSP. The experiences of several students are detailed in Dr. Asera's report.

PART I: QUANTITATIVE EVALUATION OF MSP

UCSF MEDICAL SCHOLARS PROGRAM
QUANTITATIVE ANALYSIS, 1986-1989

Draft of Final Report
Submitted to:
Dean Emilie Osborn
Office of Curricular and Student Affairs
January 12, 1990

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Introduction

In a 1985 study of mathematics achievement among black students taking first-year calculus at the University of California at Berkeley, Treisman demonstrated that participation in the Professional Development Program's (PDP) Mathematics Workshops was associated with significantly higher final calculus grades for black students than for black non-participants. In the study described below, aspects of Treisman's evaluation of PDP are replicated for first year medical students who participated in the Medical Scholars Program (MSP).

MSP was designed to provide entering medical students of all races with an opportunity to study and work together and, in the process, acquire the skills to "do medical school." Using group learning techniques, participating students took part in workshops for anatomy, physiology, biochemistry, and other challenging first-year courses. Although not designed as a "minority program," one of MSP's principal objectives has been to assist underrepresented minority students: (1) to succeed in first-year basic science courses that have traditionally reported high failure rates among such students, and (2) to provide minority students (and other MSP participants) with exposure to the nature of careers in academic medicine.

The evaluation presented here was basically designed to assess the effectiveness of the program in assisting students to pass one of medical school's most significant hurdles: the National Board of Medical Examiners Part 1.

Sample

The sample used in this study consists of all 826 first-year students who entered UCSF between the years 1983-88. For purposes of this evaluation the group was dichotomized into an underrepresented minority sample (n=160) and a non-minority sample (n=666). Of these 93 white and Asian students were identified as MSP students (as a result of having participated in at least MSP-sponsored workshop); similarly, 71 underrepresented minority students were listed as MSP participants.

One goal of this evaluation was to examine the relationship between the academic preparation of entering students for medical school and subsequent performance on the National Boards. Among the variables examined were: student ethnicity, MCAT scores, college grade point average (GPA), and scores on the National Board Part 1. Since scores are only available for the MSP cohorts entering in 1986 and 1987, MSP students entering in 1988 are not included in most of the data described here.

Evaluation Design

The major objective of our analysis was to detect a "treatment effect", if any, associated with participation in MSP. A treatment effect, for our purposes here, is defined as the contribution to a student's

National Board score that could be attributed to participation in one or more MSP workshops.

The classic technique for isolating such a treatment effect is to design an experiment in which students are randomly assigned to either a treatment (MSP) or no treatment condition (no MSP). If our assumptions about the beneficial influence of participation in MSP are correct, a comparison of National Board scores would reveal a statistically significant difference between the two groups.

However, random assignment will not totally control for all of the potentially confounding factors (such as the student's aptitude for medical study or facility for excelling in standardized examinations) that might have an influence on Board scores. Such confounders might be controlled, however, either by matching students with similar aptitudes or background characteristics (and then randomiy assigning them to a treatment/no treatment condition) or by use of statistical methods (e.g. the analysis of covariance), so as not to confound student's test-taking ability and medical school aptitude with whatever benefits (if any) accrue to participation in a workshop.

A significant drawback to this approach, however, is that it does not adequately reflect the "real world" conditions governing participation in MSP. Participants in the program must be recruited (not assigned), and student participation is entirely voluntary. Random assignment of students to a treatment condition is thus not possible, and problems of selection bias cloud our efforts to "tease out" a treatment effect that is uniquely associated with participation in MSP.

As a result, we resorted to statistical measures to control for initial differences in background and preparation. We used least-squares methods to predict the National Board scores of students who took the exam in 1983,1984, and 1985. Multiple regression prediction equations were created using sex, college GPA, year of the test, and total MCAT score in order to predict scores on the National Board Part 1. The analysis was stratified by race. The regression coefficients derived from these analyses were then used to create "predicted" National Board scores for each student who took the exam in 1987 and 1988.

This predicted score was then subtracted from the student's actual Board score. This "difference score (DS)" was used to compare MSP students with non- MSP students. In the major analysis reported here, two-way analysis of variance (ANOVA) techniques were used to compare mean difference scores of MSP students and non-MSP students, stratified by ethnicity. ANOVA methods were also used, however, to examine differences in the academic backgrounds of MSP and non-MSP students and minority and non-minority students.

The assumption governing this technique is that the difference between predicted and actual Board score -- that is, the variance in Board scores that is unexplained by academic preparation variables -- is the variance in Board scores that is explained by "environmental" factors. These are factors other than the student's aptitude,preparation, and background skills. Our assumption, of course, is that participation in MSP is just such an environmental factor.

We also assume that MSP students are somewhat weaker

academically than their non-MSP counterparts. Thus, the goal of our evaluation was not necessarily to demonstrate that MSP students performed at a higher level on the National Boards than their non-MSP peers, but rather to show that they could perform at least as well. Put in other terms, if "weaker" students do as well as stronger students, we would hope to observe no statistically significant difference in the Board scores of MSP and non-MSP students.

RESULTS

Student Characteristics

As shown in Tables 1 and 2, there are significant differences (at $p<0.01$) in the mean MCAT scores and the mean college GPAs of minority and non-minority students. The mean MCAT score of white and Asian students for the six year period between 1983 and 1988 (mean=68), for example, is fully one standard deviation above that of underrepresented minority students. Similarly, the mean college GPA of white and Asian students in this period (3.75) is 1.2 standard deviations above that of underrepresented minority students (3.39; significant at $p<0.01$).

As shown in Table 3, when National Board scores are compared by ethnicity and year, there are significant differences (at $p<0.01$) in the level of performance. To evaluate the signficance of these differences, a two-way analysis of variance (ANOVA) was used to assess the effect of

year of entry and ethnicity on Board scores. Not surprisingly (given that a full standard deviation difference exists between the scores of minority and non-minority students), significant main effects were observed for both year of entry (significant at $p<0.05$) and ethnicity (significant at $p<0.01$). Whites and Asians do, indeed, fare better on this examination than do underrepresented minority students.

To what degree are differences in the performance on the National Boards a function of the differences in academic preparation of minority and non-minority students? To test the hypothesis that it is preparation (rather than race) which explains the rather dramatic ethnic difference in Board scores, a two-way analysis of covariance (ANCOVA) was conducted with MCAT total score and college GPA as covariates and Board scores as the dependent variable.

As expected, the analysis revealed that the variation in Board scores by race and year of entry was, indeed, a function of differences in student's MCAT scores (significant at $p<0.001$) and grades (significant at $p=0.001$). When the variation in board scores that was attributed to these two covariates was removed, no significant main effects were observed for race in the ANCOVA.

Computation of Prediction Equations

Two sets of prediction equations were used to calculate predicted Board scores for sample students. As shown in previous analyses, GPA and MCAT scores differ dramatically by ethnicity. Thus Board scores were

regressed on these two variables as well as year of entry and gender. The analysis was stratified by ethnicity and stepwise variable selection methods were used. Stepwise variable selection is achieved by choosing variables that make the greatest statistically significant contribution to the regression first, then the variable making the second most significant contribution next, and so on until all variables in a list of predictors have been either included or discarded.

In creating a suitable regression model only the scores of students from the pre-MSP era (1983-85) were used in this phase of the analysis. The assumption here is that -- all things being equal -- performance on the board should not vary significantly from one year to the next. The scores of 1986 and 1987 UCSF first-year students should not differ significantly, therefore, from those of their peers in previous years. To test the validity of this assumption,however, year of entry was used as one of the predictor variables in the equation (so that is annual differences in scores were significant, these differences could be factored into the computation of a predicted score for students in the 1986 and 1987 cohorts).

Regression Results

For non-minority students, both total MCAT score and college GPA were retained in the calculation of the regression equation. Both variables made statistically significant contributions to the analysis (MCAT was significant at $p<0.001$; GPA was significant at $p=0.007$). In all, the

regression accounted for 28% of the variance in Board scores for non-minority students (Multiple R=0.53). For minority students, only MCAT Total Score was selected (significant at $p<0.001$). Theprediction equation accounted for minority students accounted for slightly more of the variance (31%) than the prediction equation computed for non-minority students, and the multiple correlation coefficient was slightly higher (Multiple R=0.56)

MSP VS NON-MSP Comparisons: Academic Background

As shown in tables 4 and 5, the mean college GPA and MCAT scores of both minority and non-minority MSP students were uniformly slightly below those of their peers. In a two-way analysis of variance examining the mean GPA and the mean MCAT score of sample students by ethnicity and involvement in MSP, significant ethnic differences in the scores and GPAs were observed. However, there was no significant main effect for membership in MSP. Put in other terms, since MSP was fully integrated racially, the differences in program participation were, for all intents and purposes, cancelled out.

BOARD SCORES

As shown in tables 6 and 7 and there were significant differences in both the predicted and the actual National Board scores of MSP and non-MSP students. In general, the prediction equations underpredicted the

actual performance of all students, but the difference between predicted and actual Board scores for non-minority MSP students was greater than that observed for any other group. When ***predicted*** scores were compared by ethnicity and membership in MSP, significant main effects are observed for ethnicity (at $p<0.01$), for membership in MSP (significant at $p=0.05$) and for the interaction between membership in MSP and ethnicity (significant at $p<0.05$). The mean predicted score for MSP members was 531 compared with 565 for non-MSP students.

When ***difference*** scores (the actual Board score minus the predicted Board score) were compared by race and MSP membership, however, the exact opposite results were observed: neither ethnicity, nor MSP membership, nor the interaction between membership and ethnicity is statistically significant.

DISCUSSION

A number of significant points are raised in the analysis. Minority students differ dramatically from their non-minority peers upon entry into the first-year of medical school. In the past, these differences in preparation have resulted in higher failure rates for minority students (nationwide, not just at UCSF) in both first-year basic science courses and on the National Board of Medical Examiners, Part 1.

This trend has certainly been observed at UCSF. As noted in the results presented here, minority and non-minority students differ significantly with respect to MCAT scores and college GPA, both of which

are significantly correlated with success in medical school and on the National Boards. This difference is most dramatically reflected in the Board scores that MSP students were predicted to have using our regression equations. Simply put, past experience suggests that the typical MSP student would be expected to differ signficantly from the typical non-MSP student with respect to performance on the Boards.

What is clearly most significant, however, is that the difference between what was predicted and what was actually observed was not at all statistically significant, and that the predicted interaction between ethnicity and membership in MSP did not, in fact appear. Although minority students do not do as well as non-minority students when actual board scores are compared, these differences have been overcome at least to the extent that failure on the Boards for minority students at UCSF have apparently been eliminated. That there is no significant difference in Board scores between MSP and non-MSP students, and that there are no significant interaction effects observed when MSDP membership and ethnicity are examined simultaneously suggests that the program has achieved one of its most significant goals.

COMMENTS

The apparent "program effect" described here, while impressive, may be the result of a variety of factors that are unrelated to participation in MSP. The recruitment/selection procedures of the program, for example, may result in the participation of students who are more motivated or who

are harder workers than non-selected students. Such differences -- if they exist -- cannot be controlled using the statistical methods employed here and if present, would suggest that it is student motivation, not MSP, that accounts for the results described here.

However, the results of our qualitative evaluation (Asera, 1989) suggest that MSP is perceived by students to be a major factor in their positive adjustment to both the academic and social rigors of medical school. We believe that the program has provided students who might otherwise be "at risk" with the means to succeed. Certainly MSP's existence suggests that the institution can continue to admit minority students (and students with less than stellar academic credentials), reasonably confident that the means exist to assist these students to succeed and, perhaps, excel.

Table 1

D E S C R I P T I O N O F S U B P O P U L A T I O N S

Criterion Variable MCAT
Broken Down by MINORITY
by CLASS

MCAT
CLASS YEAR

Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population			66.0107	8.5723	844
MINORITY	1.00	WHITE ASIAN	68.0422	7.4792	664
CLASS	3	1983	67.3894	8.3841	113
CLASS	4	1984	66.5229	8.3395	109
CLASS	5	1985	67.4836	7.5067	122
CLASS	6	1986	68.4078	7.3744	103
CLASS	7	1987	68.7182	6.4625	110
CLASS	8	1988	69.8692	6.1630	107
MINORITY	2.00	NON WHITE	58.5167	8.1915	180
CLASS	3	1983	57.8621	8.6550	29
CLASS	4	1984	58.5313	10.5157	32
CLASS	5	1985	59.3889	7.4765	18
CLASS	6	1986	58.9459	7.8985	37
CLASS	7	1987	59.7419	7.0662	31
CLASS	8	1988	56.9697	7.1435	33

Table 2

D E S C R I P T I O N O F S U B P O P U L A T I O N S

Criterion Variable GPAX
Broken Down by MINORITY
by CLASS

UNDERGRAD GPA
CLASS YEAR

Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population			3.6726	.2770	840
MINORITY	1.00	WHITE ASIAN	3.7480	.2023	662
CLASS	3	1983	3.7715	.2015	113
CLASS	4	1984	3.7267	.1864	109
CLASS	5	1985	3.7213	.2226	122
CLASS	6	1986	3.7568	.2259	104
CLASS	7	1987	3.7493	.1633	109
CLASS	8	1988	3.7657	.2053	105
MINORITY	2.00	NON WHITE	3.3921	.3324	178
CLASS	3	1983	3.4003	.3589	29
CLASS	4	1984	3.4313	.3607	31
CLASS	5	1985	3.3276	.3464	17
CLASS	6	1986	3.2862	.2812	37
CLASS	7	1987	3.4442	.2580	31
CLASS	8	1988	3.4512	.3770	33

Table 3

D E S C R I P T I O N O F S U B P O P U L A T I O N S

Criterion Variable NB NATIONAL BOARDS
Broken Down by CLASS CLASS YEAR
by MINORITY

Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population			555.9016	91.2413	671
CLASS	3	1983	562.4143	89.9411	140
MINORITY	1.00	WHITE ASIAN	576.2883	86.0441	111
MINORITY	2.00	NON WHITE	509.3103	85.9581	29
CLASS	4	1984	534.7101	93.3770	138
MINORITY	1.00	WHITE ASIAN	547.9630	84.8970	108
MINORITY	2.00	NON WHITE	487.0000	107.6521	30
CLASS	5	1985	553.5766	83.6263	137
MINORITY	1.00	WHITE ASIAN	559.9580	83.2331	119
MINORITY	2.00	NON WHITE	511.3889	75.4361	18
CLASS	6	1986	555.8871	89.6426	124
MINORITY	1.00	WHITE ASIAN	569.4444	82.4738	90
MINORITY	2.00	NON WHITE	520.0000	98.8878	34
CLASS	7	1987	573.5758	96.0827	132
MINORITY	1.00	WHITE ASIAN	592.5000	84.2461	102
MINORITY	2.00	NON WHITE	509.2333	106.9662	30

Table 4

DESCRIPTION OF SUBPOPULATIONS

Criterion Variable MCAT MCAT
Broken Down by MINORITY
by MSP

Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population			66.4941	8.1879	421
MINORITY	1.00	WHITE ASIAN			
MSP	1.00	MSP	69.0031	6.6539	320
MSP	2.00	NON MSP	68.8261	6.9053	92
			69.0746	6.6065	228
MINORITY	2.00	NON WHITE			
MSP	1.00	MSP	58.5446	7.4223	101
MSP	2.00	NON MSP	57.7606	6.9805	71
			60.4000	8.2026	30

Table 5

DESCRIPTION OF SUBPOPULATIONS

Criterion Variable GPAX UNDERGRAD GPA
Broken Down by MINORITY
by MSP

Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population			3.6683	.2808	419
MINORITY	1.00	WHITE ASIAN			
MSP	1.00	MSP	3.7572	.1989	318
MSP	2.00	NON MSP	3.7768	.1644	91
			3.7493	.2110	227
MINORITY	2.00	NON WHITE			
MSP	1.00	MSP	3.3886	.3163	101
MSP	2.00	NON MSP	3.3539	.3505	71
			3.4707	.1963	30

Table 6

D E S C R I P T I O N O F S U B P O P U L A T I O N S

Criterion Variable NB NATIONAL BOARDS
Broken Down by MINORITY
by MSP

Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population			565.0078	93.2587	256
MINORITY	1.00	WHITE ASIAN	581.6927	83.9978	192
MSP	1.00	MSP	583.0000	89.8132	40
MSP	2.00	NON MSP	581.3487	82.7086	152
MINORITY	2.00	NON WHITE	514.9531	102.0705	64
MSP	1.00	MSP	499.4651	97.8649	43
MSP	2.00	NON MSP	546.6667	105.5146	21

Table 7

D E S C R I P T I O N O F S U B P O P U L A T I O N S

Criterion Variable PREDICTED BOARD SCORES
Broken Down by MINORITY
by MSP

Variable	Value	Label	Mean	Std Dev	Cases
For Entire Population			554.9002	50.9158	418
MINORITY	1.00	WHITE ASIAN	572.5993	39.6703	317
MSP	1.00	MSP	572.6918	39.5775	91
MSP	2.00	NON MSP	572.5621	39.7953	226
MINORITY	2.00	NON WHITE	499.3495	41.5649	101
MSP	1.00	MSP	494.9592	39.0909	71
MSP	2.00	NON MSP	509.7400	45.9346	30

PART II: QUALITATIVE EVALUATION OF MSP

UCSF Medical Scholars Program
--- Year Three ---

Summative Evaluation
--- Qualitative Component ---

24 July 1989

Rose Asera, PhD

Tom Barton, MD

UCSF MEDICAL SCHOLARS PROGRAM — YEAR THREE

QUALITATIVE EVALUATION

I. Introduction:

The Medical Scholar's Program (MSP) at the University of California, San Francisco (UCSF), School of Medicine, is a program to increase the numbers of underrepresented minorities and women choosing careers in academic medicine. MSP is modeled after the University of California at Berkeley's Professional Development Program (PDP). The PDP Mathematics Workshop has dramatically increased the number of minority students pursuing careers in mathematics- and science-based fields. With funding from the Fund for Improvement of Post-Secondary Education, MSP began in Fall Quarter, 1986. The MSP adaptation at UCSF is the first attempt to translate the PDP principles to a medical school setting.

The heart of the Medical Scholars Program is a number of small adjunct workshops connected to basic science courses. In contrast to many programs for minority students, MSP disdains remediation as its main function; the workshops stress academic achievement and excellence for participants. At each workshop session, students work collaboratively on challenging problem sets.

This report is one component of the summative MSP evaluation at the end of its three year start-up period. A different group of evaluators are preparing a quantitative analysis of student performance for inclusion in the final report. The objective of this qualitative segment is a presentation of personal perceptions and experiences of participants in MSP.

II. Methods:

The same team of evaluators who worked on the previous annual qualitative program evaluations, an educational consultant and a physician, prepared this report. The current (1989) evaluation is based on workshop observation, interviews with the participants, document review, and review of data collected in earlier qualitative evaluations of MSP.

Sixteen people were interviewed as part of this evaluation. Interviews were semi-structured, open-ended, and lasted from forty-five minutes to two hours. Of those interviewed, six are first year student participants, two are participants from a previous

year, six are current workshop leaders and student staff. The length of interviewed student involvement in MSP ranged from one quarter to three years, with the inclusion of some students who opted not to participate for the entire academic year. Student interviews focused on personal satisfactions with and concerns about MSP. These discussions also touched on individuals' backgrounds and experiences in medical school. Two medical school faculty members were interviewed with increased attention to issues of how MSP is viewed within the broader school community.

III. A look at a workshop:

In a wide double room, with the accordion divider pulled back, tables have been rearranged to form two clusters. A little before 5:30, when the workshop is scheduled to begin, a first year student is going over material with one of the second year workshop leaders. Holding up one hand pointing with the other, the student talks about the muscles and nerves in the arm: which side is 'radial,' and which is 'ulnar.' Another student enters and joins the conversation about what they'll need to know for upcoming exams in neuroanatomy. All three trade mnemonics for remembering the nerves in the hand. The workshop leader also points out related topics they might want to review from earlier courses in anatomy and physiology.

This neuroanatomy workshop takes place late in the third quarter of the academic year. Second year students led the workshops during Fall and Spring quarters, but now ten first year students who will be next year's workshop leaders are serving as apprentices. Tonight's worksheets have been constructed by two apprentice workshop leaders in collaboration with a current workshop leader. The two leaders-in-training come in at 5:30, lay out the eight pages of worksheets on the counter, take their own copies, and sit down at different tables.

For the next fifteen minutes or so, students come in, pick up worksheets, and sit down at the tables. Of the seventeen or eighteen who regularly attend this workshop, twelve are present tonight. The group reflects the diversity in the population of California: almost equal proportions of the group are Black, White, Hispanic and Asian; half are women, half are men.

While settling down, students begin attacking the worksheets. A few get up to get a piece from a cake brought by a workshop leader for a student's birthday, one is also nibbling on a sandwich for dinner. Noise levels rise in animated conversation. Students begin to answer worksheet problems, refer to the syllabus open on the table, and pose questions to each other frequently.

"Karl," one student checks with the workshop leader, "do you really use a nystagmus check in neural exams?" The workshop leader replies, nodding, "Um-hmm. And can you name the ten layers of the retina?" A student jokingly starts counting, "One, two, three, four..." The workshop leader tells the table, "You definitely should know them and the cranial nerves."

The three workshop leaders, who are facing finals within a few days, and national boards within a few weeks, make sure that the workshop is under way. Then at about 6:15 they leave it in the hands of the apprentice workshop leaders.

The apprentice workshop leader reads a question to others at his table, "Describe the calorie test--without reading it." Another student replies, "If you put warm or cold water in one ear, the change in pressure causes a pulsing nystagmus."

The workshop leader follows with a second question, "If you put water in the right ear, which direction will the pulsing be?" The discussion is accompanied by hands and heads moving, and follow-up questions from the students, "Is it reversible? If you put in cold water, will you get pulsing in the opposite direction?"

In response to a question about kinocilium and stereocilia and depolarization by clockwise rotation, a student talks through the process out loud and draws a sketch on the worksheet. The person next to her is listening attentively and nodding her head from side to side. "Could we go through this one more time? This is good." The first student repeats the explanation with added commentary from her friend.

A student whispers across the table, "I just know on the test they'll ask this in the opposite direction."

At the other table students work on questions individually, then begin to go over the answers together. "Would you consider hair cells mechanical or chemical?" one asks. "Here they are," another student supplies indicating the page in the syllabus, underlining it with a yellow highlighter, "Cochlear hair cells, they're listed under chemical."

The new workshop leaders carefully stick to the teaching techniques they have seen modeled throughout the year. "Mike, is the answer to number 1, the one about the intracellular messenger and rhodopsin, false?" Mike turns the question back on the table, "What do you guys think?"

For a few minutes around seven o'clock, one table goes off on a short digression about horror movies, then the conversation returns to the worksheet. A question stimulates the group at one table to test each other's peripheral vision. One student moves a brightly colored pen slowly around at shoulder level from behind another student's back. Students note the difference between when they first perceive the object and when they recognize its color.

The workshop goes on until 7:30. Students pack up papers and books, and leave in small groups. As they are leaving, a student asks about my observation. When I mention that this is part of the program evaluation, students offer strong summary statements. "This program is helpful, especially for courses like this with a huge volume of detail to keep up on." "These workshops are a good gauge, they let you know what you know and what you don't know.

...

A team of faculty members and administrators from the City University of New York, interested in starting an undergraduate workshop program in biology, visited the MSP neuroanatomy workshop earlier this spring. One biology professor, in a conversation with the MSP evaluator, described the workshops,

> These (MSP) were the most encouraging workshops we saw. Even in the midst of training the new workshop leaders, it was well done. There was a lot of enthusiasm and kidding around, but real energy was directed toward the material. We saw a lot of hypothesis generating and hypothesis checking out, and vocabulary review. There seemed to be full participation, and people took time when an individual needed more time. There was a sense of community, not of competition. This is really the model we want to aim for.

IV. Three years: evolution and development:

In 1986, the Medical Scholars Program began with a dedicated faculty member, an interested second year student, and a small number of first year students. Among staff, that first year was marked by a sense of excitement and experimentation; student participants responded to the initial effort with some strong appreciation, some disenchantment, and some confusion about the mission of the program. Over the course of three years MSP has adapted to the special characteristics of medical education and students to become a recognized part of the medical school community. MSP has maintained a commitment to its original goals, and has taken on additional goals as well. As in previous evaluations, a strength of MSP is its responsiveness to student needs. Student input has been, perhaps, the major stimulus for evolutionary change in program goals and styles.

1. Change in participant population and numbers

MSP's original mission was to increase the numbers of minorities and women pursuing careers in academic medicine. In the first year of the program, the majority of students recruited were members of these target populations. That early experiment with restricted recruitment produced perceptions of stigma and separatism. As a direct result of participant feedback from the program's first year, the workshops have subsequently been open to all students. While enrollment is open, there continues to be a special effort to recruit minority students through letters and a presentation at the minority student weekend.

Removing the 'minority program' label not only increased the number of participants, but has helped draw in a number of strong minority students who in the past have been put off by the tone of other 'minority programs.' As one Black student described her decision to participate,

> At first I wasn't going to do MSP. I've seen other minority programs and they've all been so condescending. But in the first few days I met all these people, not just minority students, but everyone and they were going to MSP, so I thought I better go along. I liked the people, it felt comfortable, having a mix of all different types of people.

It also became clear that many of the issues facing the target students could effectively be addressed within the context of issues which face the whole class of medical students. The enthusiastic enrollment in the anatomy workshops supports this decision. This year, size was the limiting constraint; each anatomy workshop was limited to forty students.

A change in student perception of the program appears to be related to the increased enrollment. In earlier years there was confusion about whether MSP was an 'honors' program, or a 'remedial' program. Interviewees indicated that MSP is now viewed as a program for students who prefer an interactive group style of learning and studying.

2. Change in program goals

The program has maintained a long term commitment to increasing the number of minorities and women in academic medicine. There is a small, but annually increasing group likely to fulfill the program's goal of increased diversity among those in academic medicine. Each year a group of six to ten workshop participants become workshop leaders through a process of strong academic achievement, invitation, and self-selection. Any of these student-teachers who choose to pursue clinical teaching or academic medicine have gained personal expertise in an effective style of pedagogy and a sense of potential satisfactions of teaching as a career.

At the same time, in response to student feedback, MSP has altered its initial focus on academic honors and has become more supportive of individual participants' own academic goals. A fourth year student retold why this change came about.

> In the first year we were really a 'scholar's' program, pushing people to be scholars. We emphasized grades and honors; we really gave the feeling that it was important to do well, both for them and for the program. Some students felt they'd let us down if they didn't do well. Well, that's changed drastically. We're now oriented to helping the students meet their own goals, whether it's to get honors, or to get through.

As MSP has grown and expanded, it has taken on an additional role in the school community. Each fall quarter MSP workshops guide a large number of students through the transition to medical school. A workshop leader commented,

> More than half of the students in the first year class enroll in the MSP anatomy workshop. Many of them feel that MSP is something that they can do for a while that helps them learn 'how to do medical school.' After the first quarter they feel they don't need it, which is fine. There's a smaller group, maybe twenty to thirty students, for whom this is the way they want to learn the material, this fits their learning styles and personalities.

3. Change in operation to a student-run program:

The Medical Scholar's Program began as a faculty initiative. But over three years, the student involvement and enthusiasm has changed the program so that students now fill the majority of active roles within the Medical Scholars Program. Second year students

lead the workshops and construct the worksheets. Third year students regularly visit the workshops and provide support for the leaders. The associate director position, held by a fourth year student, is an evolving role, taking on most responsibility for daily decision making and some long-range planning. Dr. Mindy Fullilove, the original faculty sponsor, is still closely affiliated with MSP as a mentor and role model, but there is less need for her to participate in the day-to-day functioning of the workshops.

V. Strengths and Satisfactions:

One potent strength of MSP is what one student named the 'multigenerational' quality. Medical students provide support and guidance--academic and personal--to other medical students. First year students have a chance to observe and discuss the experiences of those ahead of them in second year, and in a more limited way, in the clinical years. Second and third year students are in a position to pass on knowledge they have acquired, but even more to pass on 'student culture,' and the knowledge about how to cope with medical school.

Students and faculty recognize that the basic science portion of medical education is an extremely stressful experience. As long as medical school continues to be taught in the present manner, a small program such as MSP cannot realistically alleviate all the stresses of role change, curriculum, pressure to achieve, etc. Current and past participants, however, felt that MSP ameliorated some of those stresses, particularly those related to organizing material for effective study.

1. First-year students' experiences:

First year participants felt that MSP workshops were a comfortable learning/studying environment. In addition, several felt that the workshops were supportive and personal, a quality given less attention in the large formal basic science lectures that form the bulk of the students' first year of medical school. In the words of several participants:

> There is a lot of rote memorization and ego-busting in medical school. We'd all be better rounded if we did other activities but the system forces people to be closed in. MSP was one way to avoid that very narrowness.
>
> ...
>
> The first year of medical school is so isolating. You're surrounded by people all day, but you're not interacting with them. At MSP I felt like I could talk with people and still feel like I got studying done.
>
> ...
>
> MSP was a place to express feelings, and to see that other people also found the material difficult, you're not the only one with a problem.

a. MSP teaching style

First year participants appreciated the collaborative and participatory approach of the workshops. The following statements illustrate satisfaction with the organization of the material and the influence of the group interaction in studying. As expressed by various students:

> It was helpful to see the old exams, and to find out what's expected. It was good to get an overview, a framework, the big picture. Like for the arterial pathways, instead of just the separate parts of the body, the workshops helped put the whole thing together and to talk about the relationships within the body.
>
> ...
>
> I found that people were really willing to work together, were helpful and shared what they knew. The workshop helped put order into the volume of material. I thought at first that it might take up too much time, but it was just two hours a week.
>
> ...
>
> Working in the group was good. When you explain something, that helps cement your own understanding of it. And it's good to get explanations from other points of view; everyone pooled their knowledge. There are different ways to study. In the class you learn it from one person, and homework you're learning from the syllabus, in MSP you learn from the group.

Students were aware, however, that workshops were neither a panacea nor a replacement for individual study. In fact, participants found that the workshops were most effective as a study tool when the students first studied the material on their own. Then the workshops served as a reinforcement or review, or as a place to gain an in-depth understanding.

> MSP didn't take over for individual study time, but it made that individual time more productive. I'd often read the material before, but didn't always understand it. That was when the group was really helpful. For me it works if I'm prepared, but it doesn't if I'm not.

Workshop leaders, all of whom had recently taken the same classes, were sensitive to the importance of relative timing of material in lecture and workshop. For example, leaders chose not to include material from that day's lecture on the worksheet. This grace period alleviated a significant student frustration mentioned in last year's evaluation.

b. Workshop leaders

Workshop leaders are responsible for constructing the weekly worksheets and review questions, and for being present during workshop to work individually and in

small groups with students. Many first-year students repeatedly stated the value of having second-year students fill these roles.

> I really liked having someone there who had been through it before.
>
> ...
>
> I'm so grateful that the second-years took their time to do this for us. They're busy with so many other things to fill their time.
>
> ...
>
> The workshop leaders were really special, and I felt they cared about us as people.

c. Support during first quarter transition

MSP is now an elective class within the formal curriculum of the medical school. Some students enrolled throughout the entire academic year, others chose not to sign up after the fall quarter. As mentioned earlier, a number of participants felt that MSP was most useful to them as a support in the transition to medical school. The two following comments are typical of students who attended MSP only for the fall quarter.

> I felt like I had learned enough from MSP in the first quarter. I learned how to study and figure out what I needed to know. Anatomy is scary--it has that aura of being a 'killer class,' but I got through it and did okay. I thought I had enough of a clue of what was going on, and I chose not to continue with MSP.
>
> ...
>
> I'm glad I did MSP. I met classmates, worked with them and built solidarity. I enjoyed the second-year students. I feel comfortable with my anatomy experience. Near the end I realized that I was learning more on my own. I had to study on my own before the workshop to really use the workshop. Towards the end of the quarter it seemed like the time commitment was more, so I decided not to enroll in the Winter.

2. Workshop leaders' experiences

Second-year workshop leaders felt they gained a tremendous amount in their teaching. Workshops provided contact with first year students and a good review of the first year curriculum. One recurring theme that emerged strongly in interviews with workshop leaders was satisfaction with the opportunity to contribute to others, to the program, and to the school community. Most of these student workshop leaders reported choosing the field of medicine as a way to work with people and contribute to society, MSP has been a way to begin to fill these goals while still in school. Workshop leaders reported:

> It feels good to help someone. We tried to concentrate on the people that seemed to be fluctuating--those who seemed to know the material in workshop, but were variable on tests. And it turned out that the problems were often personal, not academic capacity.
>
> ...

MSP had been really helpful to me and being a workshop leader was a way for me to give something back to the program. There was some training at the end of last year, but I really came into the beginning of this year not knowing quite what to expect. I still sort of thought of myself as a first year medical student, but the differences with these students were immediately apparent. The first year people were very anxious and they were struggling. They were grateful to have landmarks in the first year. One thing is that they're so excited. It's good to see their enthusiasm, we do get jaded.

...

Sometimes we talk about the whole system: medicine and medical school. I feel like I can't change the whole thing, but MSP helps me to do the little I can do.

a. Balancing responsibilities

The second year leaders were aware of potential conflicts between their own school demands and their responsibilities as MSP workshop leaders. All those interviewed reported that they carefully planned for and balanced their schedule to meet both commitments. Representative comments from different leaders included:

It usually took about six or seven hours per week, sometimes more. I reviewed the material over the weekend, and then there were the meetings to work on the worksheets and the workshop itself. Some subjects, including neuroanatomy, which has a large volume of detail, takes more time to review every week, but I feel like I really know the material going into the boards.

...

I made a conscious effort not to have a conflict between my MSP responsibilities and my own classwork. I was aware that it was a possibility. But I felt like I'd mastered studying, and could keep consistent with my own work.

b. Growth of the program

One summary comment from the student associate director reflected the feeling of increasing maturity and continuity between the program's beginning and the third year:

This year there seemed to be a sense that we know what we're doing. We're not just flying by the seat of our pants. We have last year's worksheets to build on. People have been in workshops and then become leaders; they know what works.

VI. Perceptions within the school community:

In earlier evaluations only student participants and workshop leaders were interviewed. A composite picture of MSP emerged, but it was largely limited to a view from within the program. This year, as part of the summative evaluation, an effort was made to find out more of the view from the broader school community. Two faculty

members were interviewed about the experience of first year medical students, the resources available to students and the specific service which MSP provides.

One faculty member/administrator presented a political and historic perspective on minority programs at the medical school and the way MSP differs from earlier efforts.

> This program came at a good time for UCSF. For ten or twelve years UCSF had funding for HCOP--Health Career Opportunity Program--for minority students. But the funding was cut back about the same time that MSP was in planning. I was uncomfortable with the sort of remedial/patchwork of programs with HCOP; there was really no drive to the program. So MSP appealed, plus it has the advantage of being prospective--don't wait for students to fail, put support in place in advance and get away from remediation. We still have remediation needs. It's good to have one more resource above tutoring, a non-threatening setting which does challenge the students.
>
> Just pedagogically, MSP provides another way to learn the material. But it also provides a social milieu, where students work together and students teach each other. There are studies which found that achievement in medical school increases when students engage in teaching. I like the format and the student involvement. I do have a concern that it's a little risky--it puts responsibility to teach the material on the students, that responsibility should be on the faculty. Students may not always be as wise, and there may be a potential conflict with their own studies. But I feel like the advantages outweigh the disadvantages.
>
> There are many resources available to first year students-- an educational psychologist, stress reduction courses, individual and group counseling, peer counseling. MSP is one more resource among other resources. We know from experience that when our students get into academic difficulty, it's not just an academic problem. It's so important to find what the personal issues are. MSP is more structured at that interface of the academic and the social.

Another faculty member, professor of a first year basic science course, has a similar sense of the role MSP serves for students. He is keenly aware of the stresses and strains which first year students experience. The medical school has made a strong effort to make resources available to these students. MSP is one resource among a wide selection. MSP's preventive quality (not waiting until students are in academic difficulty) and its informal supportive environment allow it to fill a special niche.

> The first year of medical school is extremely stressful for all students. We're aware of this and there are a lot of resources available. For the last five years at orientation we held a group session where second year students talk about the feelings connected to working on cadavers. We started this in response to students' request. The campus minister is on hand and there are a lot of referrals to counseling. Academically, there are also a lot of resources: models, video tapes and a practice exam in the lab. Faculty give reviews for the students on request. Through the dean's office there are second year students who will tutor, but there are a limited number and they don't like to assign them until after the first midterm, and only then to students really in trouble.

My perception of MSP is that it's a special resource. I do see it as tutorial, students who go are weaker and the stronger students don't keep going. It seems like a lot of the program is repetition, which is fine. The students need it, and it takes some of the pressure off us to do that review. It seems to give emotional support to nervous or anxious students, a place for them to go other than the formal course. It's easier for students to go, it's student- run, it's not as scary, they're not going to be evaluated. In many ways MSP does what every teacher would like to do-- just be there to help, but we can't always because of our roles.

VII. Areas needing attention:

While there is strong satisfaction with the setting and teaching style of MSP, participants have also identified programmatic areas which require further attention. Some of these, such as the need for more internal communication pathways, have been identified in earlier years, and continue to be a challenge not yet adequately addressed. Other areas, such as the conflict between size and personal attention are a result of the program's expansion. In some cases, participants offered suggestions to help MSP be more consistent with its own goals.

1. Conflict between size and personal attention

The expanded size and roles present a challenge to MSP, one which workshop leaders feel strongly. Two workshop leaders expressed this dilemma,

The anatomy workshops were too large, but how can you exclude people?

...

I'd like to see us really lower the ratio of students to workshop leaders. The workshops in the later quarters, when they're smaller, are much more personal. It's really a challenge to us to maintain quality and communication as we get bigger.

2. Communication and organization within MSP

Insufficient lines of communication have been identified as a problem since the 1987 evaluation. In particular, there is still a need for an organized format to regularly elicit student feedback. Similarly, it would be helpful to have a functioning method to obtain direct feedback from students who stop attending MSP workshops mid-quarter or mid-year.

The increased enrollment and number of workshops makes it even more compelling that lines of communication be designated. In spring 1988 six students were hired for academic year 1988-89. Four were designated workshop leaders, and two were to be 'floaters' or individual tutors. With the large numbers of first year students enrolled in

anatomy, all six became workshop leaders and continued throughout the entire year. Expecting the same large numbers next fall, ten students have been hired as workshop leaders, to hold three or four anatomy workshops, instead of just two. This increase will require greater communication and coordination.

As students take on the responsibility for running MSP, the leadership roles and the responsibilities of the third and fourth year students need to be delineated. At one point in the academic year, there were some feelings among workshop leaders that one workshop leader was not fully participating. This situation was cleared up, but resolution of this problem was undoubtedly delayed because there was no specific pathway or sense of whom to approach with the problem.

3. Insider/Outsider: addressing diversity

In each year's qualitative evaluation, a very small number of students, often those in the target population who have arrived at medical school against the greatest odds, said that they thought that 'MSP was a good idea and a good program, but it didn't work for me.' This year one student contributed a socioeconomic perspective that crosses ethnic boundaries in considering the diversity of student backgrounds.

> The medical school talks as if there's a real diversity in the student body. But that's only looking at it with the eye. There are some people here who are really underrepresented. I became aware that many of the minority students here come from professional families. If you're from a working class background here, whether you're Black or White, you're likely to have a hard time. And the more different you are, the more difficult--if you're older, minority, working class or a woman, God forbid you have them all.
>
> A lot of the students here, including a lot of the minority students come from backgrounds where their father was a doctor, or their sisters and brothers went through medical school. They have inside knowledge about how it all works. To get through here you really need a good support group. There's too much work for any one person. But those who have more, they don't really share it. This isn't the open community people would like it to be.
>
> The problem is bigger than just MSP, or even just medical school. It's really what's going on in all of higher education. MSP has the right things in mind, but the workshop leaders really could pay attention to how people socially cue up, and who doesn't get picked up in study groups outside of MSP. There's still a need for a place for people on the fringe to go.

4. Fine tuning the workshop

There is strong enthusiasm for the workshops among the participants, but some specific areas were identified as requiring attention. In keeping with the problem-solving nature of MSP, when interviewees identified a difficulty, a suggestion usually accompanied it. In fact, some of the program's most enthusiastic participants offered the most detailed suggestions for change. One student framed her comments,

> The MSP philosophy is very valuable and the program is beneficial, these changes would help the program be more in line with its own goals.

a. Groups and Pacing

Several students noted that the dynamics of the group sessions were sometimes uneven:

> When the groups work, it's wonderful, people help each other. I come out feeling energized. Bu. when it's not working, the workshop leaders need to remind people of the philosophy. This is a group, if people know, they should share. Especially when there are so many worksheets, some people just want to race to get through. They don't want to take the time to explain to others.
>
> ...
>
> In the beginning they explained about the group, but sometimes it broke down and dominant people took over. That's not necessarily a problem if the person can explain, but sometimes they'd treat it like a race and just want to get through. And there seemed to be some people who came just to show off what they knew. People need to be reminded what the program is about.

b. Worksheets

Several participants noted problems with length or format of the worksheets:

> Worksheets were helpful, but sometimes they were too long. The biochem ones were good, they were a length so you could finish them, and the workshop leaders sat down with us and stayed until we were finished.
>
> ...
>
> The worksheets should be made up of strong thought questions, more like ones on tests, ones that integrate concepts. It shouldn't just have fill-in-the-blank questions from the syllabus, I can do that on my own.

c. Workshop leaders

Mixed with respect and appreciation for the workshop leaders was a plea by some participants for greater empathy:

> The workshop leaders really care, but sometimes during the workshop they'd go off together in the corner and talk. Maybe they don't get to see

each other a lot, but during the workshop they should really be accessible to the students.

...

The workshop leaders shouldn't only be people who know the material well, but should be people who can teach and communicate well. I don't know if the leaders realize how hard it is for some people. They should have empathy and not make people feel bad if they don't get it the first time.

VIII. The Future:

The immediate future holds great potential for MSP. Funding is assured as a student-run organization for the coming year. Third and fourth year students have begun compilation of worksheets into a workbook. Faculty and students at other schools are beginning to express interest in developing similar programs at other medical schools and undergraduate universities.

There are also potential pitfalls. As a student-run program, MSP will have annual turnover of workshop leaders and staff. With such rapid 'generational' change, certain original program goals may become lost. MSP has shown that it can successfully reach a wide segment of the student body. In that broad success, the focus of minority participation and future academicians could be obscured. Although MSP serves a large number of the entire first year class, the program should not become so mainstream that it loses its special quality and mission.

IX. Conclusion:

Only ten or more years in the future will it be possible to evaluate whether MSP has increased the numbers of minorities and women in academic medicine. Meanwhile, in the past three years MSP has become a recognized presence in the UCSF medical school community. MSP helps orient a large number of first year students during the first quarter, and provides a personally supportive academic setting and social community for the students who continue through the year. For second, third and fourth year students who become workshop leaders, MSP is a gratifying way to contribute to others and to gain early experience in academic teaching.

To continue this success into the future, MSP should maintain a dynamic balance, becoming neither too institutionalized, nor too isolated. MSP should continue to conscientiously strive for strong ethnic minority and gender participation. At the same time, MSP has the potential to address the needs of other individual students and groups within the medical school who feel like 'outsiders.' They too need support in reaching for excellence and establishing roles in the diverse community of the medical care providers and teachers of the future .

PART III: SUMMER RESEARCH EXPERIENCES

SUMMER CHALLENGES AND STUDENT GROWTH

A REPORT FOR THE MEDICAL SCHOLARS PROGRAM UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

Rose Asera, PhD
Educational Consultant

INTRODUCTION

Many students in their early years at medical school are still formulating their long-term career goals. Summer activities are frequently chosen by these students for the chance to explore possible careers in medicine. Academic medicine is one of these potential choices; one in which clinical practice can be combined with teaching and research in many different ways. Hands-on research projects between the first and second years of medical school can provide useful experiences to students considering a career in academic medicine.

The Medical Scholars Program (MSP) at UCSF advocates and supports minority students in pursuing such research opportunities, and preparing for future careers in academic medicine. During Summer Quarter, 1987, 13 of the 39 minority students at UCSF participated in such research experiences through Dean's Fellowships and research supported by other funding sources.

Though aimed primarily at needs of minority students, MSP believes that to adequately address educational challenges to minority students, it is necessary to address the educational needs of all students. The six students interviewed, typical of the multiracial mix of MSP, include three Blacks, two Hispanics, and one White. In some cases the ethnic background of the student played a significant role in the development of the research project, in other cases, ethnicity was a less important consideration.

These students participated in basic science research in laboratory settings, in community-oriented social science research, or in overseas clinical experiences in health care. This report is a description and an expression for the students of their perceived gains.

LABORATORY RESEARCH

Immunology and Leukotrines in the Lab:

For Carmen, the attraction of doing laboratory research is the clarity of the thought process it encourages. She first encountered this model in a program the summer after her sophomore year in high school.

> "My first experience doing research at the immunology lab at Georgetown Hospital in Washington, DC, has kept me coming back for more. That was definitely the single most influential experience, I learned a lot, and had fun doing it. I liked the people I worked with; the knowledge I gained working that summer is still with me."

Carmen spent her summers through high school and college doing laboratory research: at Georgetown Hospital studying the effect of neutrophils on inflammation; at the Museum of Natural History working with crayfish; at Walter Reed Hospital, in the Department of Bacterial Medicine studying basic science aspects of gonorrhea.

Although she took all the pre-medical classes while at Vassar, Carmen denied being a pre-med major. She believed that she was aiming towards graduate school in microbiology and a career in research. The turning point came during a Cornell University summer program for minority students entering medicine, which Carmen attended after her junior year in college.

> "The program gave us great exposure, it was 60% research, and 40% in classes and hospitals. It gave me a rudimentary, basic sense of what medical school would be like. That was when I realized that as an MD I would have a lot of choices."

Emphasis on research was a factor in her choice of UCSF for medical school. She feels that "the administration encourages and supports a research perspective here." Carmen's experience of medical school at UCSF has supported her career direction.

> "One thing that has been gratifying in the last two quarters is gaining the medical school perspective, especially as we're learning about disease and disease process. Research has a tight focus. In the lab, you have a small amount of material explored in depth, but no chance to go into the big picture. When I did lab work it didn't integrate with classes I was taking at the time. Now, especially with microbiology and my interests in immunology, I'm gaining an understanding of the context of research I've done. In the basic science research I have done I didn't see the clinical disease; I didn't see people come in with the actual disease."

Carmen realizes that basic science research may be slow and it is sometimes hard to see the long term implications. She holds no false romantic notions of the drama of research.

> "You may get an answer to a hypothesis, but it may not bring you any closer to the long range goal of figuring out how to cure the disease. Clinical or epidemiologic research may be more immediately gratifying, or have more immediate implications."

Nonetheless, she appreciates the problem solving aspects of research: identifying the problem, figuring out the appropriate techniques which fit the problem, being thorough, arriving at an answer, even if it's negative, and understanding what it means.

> "I like the whole thought process. Even though it's harder to apply the findings of basic science research, I don't find that discouraging. I like the process and I like being in the lab."

When she heard of opportunities to do summer research, Carmen checked the Student Affairs resource book for faculty projects in immunology.

> "I talked with four or five investigators; two I spoke with were already taking people on and so didn't have space for me. The mentor I'm working with seemed like the best match. He has a receptive personality, and I'm interested in the work he's doing. Also he's on independent funding for this program, so it was easier that way, too; there was no chance that it might not get funded."

During the summer Carmen studied leukotrines, the receptors of neutrophils. Four leukotrines, A-D, have been described. Leukotrine B is present in the highest percentage in neutrophils. Carmen worked on describing the non-B receptors. The project was completed, but as always with research, "there is room to go on," and she has been invited to continue if she wants.

Carmen's long term plans center around an interest in academic medicine.

> "But I haven't come to terms yet with what percentage of time in research, and what percentage in patient contact. I was familiar with research techniques, but the main thing I got from this summer's experience was inspiration: seeing my PI successfully juggle roles as both a researcher and a clinician. He spent 80% of his time in the lab, and 20% in the allergy clinic. That to me, at this stage, seems like an ideal combination, what I'd like to be able to do. I would like to spend most of my time working on some aspect of disease with hope of treating it better, while keeping up clinical contact. People had said that it's downright impossible to do both successfully. I understand it's hard; he does have a hectic life. I've had a chance to see it, and it means a lot to see it here in medical school setting."

Another thing that Carmen gained from the experience was an appreciation for the role she could perform in the lab as a student.

"I worked with a PhD in the lab. I realize that it takes a lot of time and work to train a new person. But in the process of teaching someone new, new questions came up that wouldn't have occurred before. I was also asked to write a recommendation on this person's teaching. I know it won't make a huge difference in her career, but I appreciated the chance to give something back."

At this time Carmen is considering taking off a year to have the opportunity to do an extended research project.

"Summer projects have always been short, a lot of time was taken up in learning the laboratory's techniques and developing rapport with the people. I wouldn't trade the experiences I had in different labs over the years, but now I want a chance to go deeper, to really flesh out an individual project. Money and space available are the biggest blocks in doing research. I want a chance to find out if research means enough to me to overlook the hassles. If it does, then a PhD along with the MD degree is a real possibility."

Bench-top Research on Kallikreins and Neurology:

For Michael also, research provides "the big picture," both in time and knowledge. He wants to pursue fundamental research on "how the body works, how the systems work." Research for Michael is a chance to answer important questions so that in the future: ten, twenty, thirty years down the road, "it might have some impact, it might help."

When Michael was young, there were two deaths in his family; his father and an older brother. Feeling alone, books on science were a source of solace Michael turned to.

"I always liked science. My interest in science was one thing that I could do on my own. No one had to do it with me. One high school teacher helped me to see that there were possibilities, and what part science might play in my life."

While in college, inspired by a psychology professor, "an incredible man," Michael took part in two laboratory research projects on the brain. When considering medical schools, he chose UCSF for its reputation in research.

"When I got here I thought, 'This is what I want to do.' I definitely want to be a neurologist; brain research is one of the last unknowns of medicine. We know a lot about how the body works; but about the nervous system and brain there's still a lot unknown. It would be great to devote my entire life to that."

Michael approached several faculty members to determine whether a PhD is needed to do research after finishing medical school and residency.

"In the process I met this really nice guy, a very open type who really sparked me. We had some similarities in our backgrounds, so he understood my position. Some of the other professors I talked to weren't so open, they had a more of a 'don't waste my time' type attitude.

"We talked about his research subject. It wasn't so much that his topic was interesting to me per se, as that he made it interesting. We talked for several weeks and solidified the project, one that I could get data on and publish findings."

The project Michael is working on involves a kallikrein enzyme which cleaves mature nerve growth factor. His work involves purifying the enzyme and testing its effects on the substrate.

> "Nerve growth factor was discovered quite some time ago. The researcher who did the pioneer work got the Nobel prize for it. This specific enzyme creates a specific product; but it's still not known what the protein fragment's function is, or what the physiological implications are.
>
> "In fact, I started out on something else, but every time something new comes up, you have to follow it. New questions are raised. If you follow it logically, it's got to take you somewhere. So what if it takes a year or two years. It can be frustrating, but that's also the fun of it. It raises another question. The twist of events is like a spy novel; you don't know who did it, it keeps you on your toes. Even negative results in the lab are positive, they raise new questions."

Although he worked on the project fulltime during the summer, Michael is "still hooked," and goes up to work in the lab when he has time in his schedule.

From his early readings in science, Michael has developed an appreciation that,

> "...discoveries in science, in chemistry, math, physics, not only in medicine, are not made overnight. Solutions don't just come from one person or one idea, they come from the accumulation of knowledge."

Thus the opportunity to do research allows him to personally contribute to that accumulation of knowledge. Michael has decided that he would like to pursue a PhD as well as an MD degree.

> "In a PhD program, you learn how to think, to ask appropriate questions, to look at things differently, not just to memorize material. I want to be pushed to think. Anyone can go into the lab and get results, but to figure out what it means, you have to ask the right questions, construct a good hypothesis, and understand the technical aspects of the experiment."

In the long run Michael hopes to work in a lab where he has the flexibility to work on questions of his own interest, and to pursue research that he will enjoy.

> "I can see that my mentor has the opportunity to follow his own research interests. And he's having fun. If he weren't, I wouldn't even consider it. I'd still like to see patients; patient contact and helping people are the reasons I came here. But doing research might help even more in the long run. I might be able to help people in larger numbers."

SOCIAL SCIENCE RESEARCH

AIDS and Sexuality in the Community:

Richard perceives an interconnection of his family environment growing up, his decision to go into medicine, his summer research project in the Black community and his long term goals

> "My parents were married young: my mother dropped out of high school, and it was just shortly after my father graduated. I don't know where they got the idea, but they always encouraged education. With very little money they gave us a lot of experiences. They took us to museums and the theater, and to ethnic festivals. They let us know that there was more to life and, especially for a poor Black person, education was the way to get it."

Both parents supported this view by active participation in the local PTA and working with the public schools. The first Black professional that Richard met was principal of his elementary school, a lawyer who also held a doctorate in education.

"My parents worked hard to get a Black hired as principal. It meant a lot to me to see someone who was so competent in such an important position. I felt proud, it made me look at myself differently."

As a result of his parents' attitude, Richard says,

"I always enjoyed school. I liked learning, I liked being with my friends. I came home with a sense of mastery, a sense that each day I understood more about myself and the world."

Richard was also aware of discrimination in the education system. With family support, he understood that,

"You may not always get what you deserve, but get what you can. Point out the injustices, and work to change them."

Richard did extremely well in elementary and junior high schools, and went to Bronx High School of Science, a New York City secondary school that accepts students on the basis of competitive exams and academic records.

"That school put me on the right track academically. They presented the idea that learning should be enjoyable for itself, but also to make you a better person and usefully contribute to make the world a better place."

He knew he wanted to do something in science. During Richard's junior and senior year in high school he worked with two college pre-med students in a rheumatology lab.

"I enjoyed the experience. I learned a lot about research techniques, but I found research to be incomplete and isolating. I wanted more human contact."

Medicine as a field seemed full of possibilities including, but not exclusively limited to, research. Encouraged by the two pre-med students Richard decided that "medicine was a field in which I could contribute and enjoy." Pursuing pre-med at a challenging school with the encouragement of his family, Richard attended Harvard University as a undergraduate.

"Harvard was a time of culture shock. After growing up in New York, which is very diverse, Harvard seemed very white and middle class. There was pressure to prove that you actually belonged. The message was that Blacks don't do as well, that they're only here because of affirmative action. It was frustrating and isolating. There were no Black faculty, and there was little support. On the other hand, it was an intellectually rich environment that had excellent resources and people. And I'd rather be somewhere hard that I have to reach, than somewhere too easy."

He chose UCSF for medical school because he wanted to be somewhere different, and in a more supportive environment.

"I was told by students, including minority students, that the people who teach here go out of their way to be supportive and to meet individual needs.

"After my experiences in the laboratory in high school I never considered doing summer research. It didn't cross my mind. I knew I didn't want to do basic science research. I

know it's important, but it's not personally what I want to do. However, I was so impressed by the MSP Program's intention of encouraging minority students to go into academic medicine that I didn't want to close off any possibilities. There had been no Black faculty at Harvard, and I realize the importance of visible role models. I had started looking into clinical preceptorships, when I heard about a study of Black sexuality being done by MIRA (Multicultural Inquiry and Research in AIDS).

"My friend was approached, but had already taken another position. He said that it was right up my alley. And it was what I wanted: a chance to work with and communicate with people. When I met with the investigator, she was very supportive."

The study in which Richard participated looked at Black sexual practices and behaviors with the goal of making recommendations for AIDS education programs in the Black community. There were two phases. The first was an extensive review of the literature.

"We got all the studies in the last twenty to twenty-five years. There were a lot, but they all tended to be in the same vein. Most were done for teen pregnancy prevention; they studied teenage females, and tended toward moralistic judgements about permissiveness. There were few done on teenage males or on married couples."

Richard and his co-worker, another first-year medical student, wrote up a paper analyzing the literature, the findings, and describing deficiencies they perceived in the literature.

"The second phase of the research involved running focus groups for people of different age groups from the Black community. The intention was to see if the stragegy would be effective with the community, rather than acquisition of specific information. Could this technique be used to tailor education programs to community needs?"

The two medical students worked with a doctoral candidate who had previously led focus groups. Drawing on their literature review, they were responsible for coming up with the pertinent questions to lead the groups. The response from the participants was gratifying.

"People were amazingly open and responsive. A lot of people felt that this was something that they'd never been asked before and needed to be done. There's so much covering up around sexuality, but it is a significant part of life, and rarely mentioned. People felt really good about sharing their experiences.

"The size of the groups ranged from three to twelve, most were about six. The focus group was scheduled for an hour, but we quickly realized that we had more than an hour's worth of material. The longest group went for two and a half hours. Many people wanted to meet again.

"A lot of people cooperated to make this project work. The participants were also really happy to have Black researchers, 'our own people studying us.' They were proud that here we were, we'd gone to good schools, and were in medical school. Community participants felt they could be more open; they felt good about having someone knowledgeable and sensitive about the community drawing the conclusions."

Richard sums up the experience by saying:

"This has definitely been my best experience at a job: working directly with the Black community, learning a new field. From this I feel that I definitely have a long term interest in clinical, epidemiological, or public health research."

Richard's exposure to the process of community research was extensive. He and his fellow medical student worked with the research group and gained a sense of the whole project, not just their small part. They got to see the steps of preparation and presentation of a grant proposal, and a

site visit. Each week they presented weekly progress reports so that other members of the research group could give feedback.

> "I felt treated like an equal, not just as a student. I felt like people really cared about what we were doing, that I was really contributing, and that people saw me as competent. I also found out some of my personal weaknesses. Overall, an important part was that I gained self-confidence in the professional realm, that I saw myself as competent."

Richard's long term goals are to go into family practice, "That's why I went into medicine." Three other goals accompany that:

1) participation in research related to public health issues, merging the perspectives of basic science, social science and public health;

2) membership on an academic faculty somewhere and work with medical students; and

3) work in the Black community and in community schools; starting early opening up possibilities, letting students know how many possibilities there are out there. "That's part of my definition of being a Black professional, being an active role model in the community."

<u>Survey Research on Estrogen Use After Menopause:</u>

Paul was in biochemistry, "sort of a closet pre-med" major at Harvard. After finishing his undergraduate degree he worked for two years in biochemistry labs. Yet basic research seemed like an incomplete perspective to him.

> "I thought about a lot of different things, and my interest in public health from college stayed with me. Medical school was kind of on the back burner. I wasn't sure if it was right for me. I had a lot of questions about the way medicine is taught."

Paul attended the School of Public Health at UC Berkeley. After the first year of an MPH program he decided that medicine was the direction he wanted to pursue, and began the application process. Upon completion of the masters degree he began medical school at UCSF.

From his public health background, Paul had a long-term interest in epidemiology. He wanted to use the summer experience to see if the reality of public health research matched his expectations. Although it was somewhat unusual, because of his interests Paul chose an advisor in epidemiology early in his medical school career. While looking for a summer project he "shopped around" and spoke with a lot of people in epidemiology. Eventually he chose to work on a project with his advisor.

His advisor had a file of researchable ideas that she felt it was unlikely she'd have the time to study. In choosing one of these topics, Paul could have the opportunity to see the project through all stages, starting at the beginning.

> "There were some other studies where the data was already gathered. Analyzing data isn't easy, but I really wanted to be involved from the beginning, to be part of designing the study."

As important to him as the specific topic, he chose the person to work with. His advisor's perception of the researcher's role matched his own personal philosophy,

> "She sees herself as a critic of medicine. She's critical of technology, and wants to be

sure if technology is used that it's used for the right reason."

The question his advisor brought up was related to prevalence of use of estrogen by post-menopausal women.

"The subject is hot, but it's been understudied. There are conflicting findings on benefit and risk. There's a need for a clinical trial, but NIH seems unwilling to do one. They've been burned before on the study of oral diabetics. People didn't believe the results, or some practitioners who believed in the drugs gave them anyway. With an aging population and people living longer, the question of postmenopausal use of estrogen has increasing implications."

Paul, working with input from his mentor, and a group of affiliated post-docs designed a survey to describe users and non-users of estrogen replacement. He became aware of the difference between social science research and experiments in the laboratory.

"In lab research, you can structure the experiment to have the results come out in 1-3 ways. Here, you don't have any idea how it will come out. There are also complications in getting a proposal through the Human Subjects Research Committee. And I feel the responsibility in working with people."

In the summer Paul undertook a review of related literature. His initial findings surprised him.

"From a social justice perspective I was amazed at the facts, including the prevalence of hysterectomy. The numbers are outrageous. There's an attitude that you can take out the uterus and ovaries and put the woman on estrogen and she'll be okay."

He also started construction of the questionnaire, which has gone through six drafts and revisions. Development of the questionnaire has proved more work than he anticipated.

"I've learned that an instrument is infinitely revisable. When you decide it's done and actually use it, you can't change it or you have to go back to the beginning. It puts a lot of pressure on the instrument. I've realized how important it is to make questions extremely clear, including learning how to ask questions that don't lead to a particular response by how they're phrased, or giving away what you're asking for. For example, asking questions about symptoms of menopause without telling them exactly what you're after.

"I'd worked on one survey before, but it was on playground equipment; this is a much more personal and sensitive subject. I asked my mother and she said she'd never answer questions like this. I'm not a fifty-five year old woman, and I've realized what my stereotypes about that age group are."

By mid-fall Paul began pretesting the instrument. The target group was located from a random sample of phone numbers provided by the California Tumor Registry.

"Getting to the respondents is a pain, it can take an average of twenty to twenty-five calls to reach one respondent, but when I do get one and she's willing to talk, the interviews are fun. I was worried about people being willing to talk, but once they give consent, they're willing to talk about themselves. The interview is designed to take twenty minutes, but it's usually more like half an hour."

The experience of actively doing the research includes raising ethical concerns.

"I'm impressed with how interested and aware this limited sample so far is. I had this

idea that the debate is raging in the medical community but I realize that it's going on in the general community. Women are concerned, they hear about it on health shows on TV, talk with their friends, and read health columns in magazine.

"For me this has brought up the concern of raising questions that I don't answer (or stimulating questions that weren't there before). When people are concerned about why I'm asking, it's hard to leave it open-ended. I try and recommend a source that I consider presents the information fairly. I feel uncomfortable either giving or not giving information."

Equally important to him is the concept of bias in research.

"I realize that especially in epidemiology, the researcher is susceptible to the danger of slanting how the study comes out. I also realize that I've adopted my mentor's perspective about estrogen use. I do have a bias going in. I feel like I should be impartial; but if that's even possible, it certainly isn't common."

Paul cannot sum up the impact of the experience, for it is far from finished.

"When the instrument is completed, we'll hire an interviewer. I hope to have data by the end of the school year. No one I know who did social science research finished the project in the summer. There were other projects that I could have worked on analyzing data already collected, but it's been interesting and enjoyable to see the study from the beginning.

"This was opportunity to test waters and see if I can do clinical practice and epidemiological research. A researcher has to be able to ask good questions. And I can see the danger of plowing ahead with procedures without thinking it through carefully. I know that epidemiology can be frustrating, this was an opportunity to see how I deal with these frustrations. The question I went in with is 'Is epidemiology something I want to do?' I still don't know. I might also be intrigued by molecular epidemiology, using large populations and clinical values."

INTERNATIONAL EXPERIENCE

Diabetes and Clinical Research in Italy:

The opportunity to travel as part of a summer program and see how scientific discovery is done in another culture intrigued Melissa. Her family travelled some while she was young, and she has an interest in exploring other cultures. The chance to blend travel and research was exciting.

Selecting among France, Ireland, and Italy, Melissa chose Italy. She went to the University of Padua, the oldest medical school in Europe. On arrival in Italy Melissa found that the staff didn't expect her to be able to do research in the short period of time available since "the country closes down for the month of August." So in the time available it was easier to participate clinically rather than attempt research.

In the mornings, Melissa went on rounds with the physicians on the diabetes wing. One of the rare cases she saw was a patient with an insulinoma, which the staff documented thoroughly. In the afternoons she had informal discussions with three or four of the doctors about the patients she had seen in the morning, and the research studies those patients were part of.

"The thing that impressed me most was how warm and welcoming the people were. Despite an initial language barrier and even though I was only there for a short time, they were willing to take time to show me or teach me."

The Italian national health care system is decentralized, though within the hospital everything

is done in one place.

"This structure encourages the integration of research and teaching with clinical care. Research and clinics are together, in the same building or even in the same wing. If a person specializes in a field, like diabetes, they'll work in the hospital, get into a lab and do research. They'll be guaranteed the chance to continue in that vein and go on and teach and do clinical work at the same time.

"The whole medical education system is different. Students enter medical school right from high school; anyone can go. They may have a class of 1,000, and someone might not have one-to-one patient contact until after graduation. As a result, doctors are seen differently. They are respected, but they're not high status; there's no special mystique of knowlege and intelligence.

"Residencies are set up differently too. For diabetes, for example, they don't need an internal medicine residency first as they would here. And there are tons of residencies; some residents don't get paid during first and second year of residency, they have to moonlight to make ends meet. And many live at home forever until they're married, so their expenses aren't great."

But by seeing a different example, Melissa considered the American health care system in a different light.

"The doctor-patient relationship is more equal, more on the same social level. Patients have more autonomy, the patient can come and go as they desire.

"In spite of the equality of the relationship, over there there's more freedom to do research and experiment with people. They can get more done, but I prefer the restrictions of informed consent here. The idea of experimenting on people doesn't sit well with me."

Other contrasts were obvious as well.

"In the hospitals, there is less technology and the machines in the lab broke down a lot; there's more scientific advancement here. Their socialized medicine system seems fairer to more people. Everyone has access to health care, but there are long waiting lists to see doctors in the hospitals. If people have money it is an advantage; they can see a private one."

The culture provided Melissa with a backdrop for examining differences.

"In my mind I kept comparing, 'What would this be like if I were back home?' The most obvious thing was being a Black American. It was very unusual. There are some black Africans, but I felt like I was treated with special attention. People seemed to go out of their way: men, women, old women, everyone, even more than the natural warmth of the culture. There was a lot of open and warm curiosity, a lot of questions. Most people's information about American Blacks came from media.

"The pace of life is different. Many of the things we rush through they spend more time on. They relax over meals. The food is better; they use fresh ingredients, never frozen. It's influenced my own cooking since I'm back.

"The whole country shuts down for the month of August. People go to the shore or to the mountains. Even the doctors go on vacation, and I'm told people just don't get sick.

"The Church is so much a part of their culture, but it seems to have found a balance with the secular part of life. I was surprised to see billboards advertising birth control, and open promotion of condoms for AIDS prevention."

From the perspective of her American background, Melissa was aware of two public health risks that received very little attention in Italy: drinking and smoking.

"Wine is drunk more than water. Since drinking water is also purchased, it's as cheap to buy wine. There is a lot of alcohol-related heart and liver disease among people in their forties and fifties and sixties. It seems that the only awareness was when it was already too late. If a patient was in the hospital with cirrhosis, he would be told to cut down on alcohol, but never preventively. To health care providers, it's an accepted fact of life that people drink, and there's nothing they can do about it. There was no national awareness to campaign for prevention.

"Smoking is common, everyone smokes. The demographics follow what happened here; a high percentage of men smoke, and women are just beginning to smoke a lot. A lot of doctors smoke; of the ten doctors I worked with, only two didn't smoke. There's no idea of banning smoking."

For Melissa the experience of being in another culture was thought-provoking. One example that influenced her current long-term plans was seeing the way research interacted with clinical practice.

"In my past experience I did basic research on steroids in college in a biology lab. It had no context, no hospital association. In Italy I saw a different relationship: a doctor saw the patient, and went down from the clinic to the lab and immediately did the assay. I could see how research and clinical work go hand in hand."

A Hands-on Experience of Cardiovascular Disease in Spain:

Roberto designed a proposal to study the health care policy of Spain, "Insalud." Before going he read as much as he could in the Public Health library.

"The Mexican culture is derived from the Spanish. Spain is a developed country in the Latin tradition, and also very Catholic. It's really a new country too in the last ten years, coming out of the doldrums of the Franco influence. I wanted to see health care provided to a Latino population in a developed country; how they work around issues of technology, conservatism, and religion, with a European model of disease and health care. Then I could draw comparisons to how it is done here in California."

For Roberto, a trip to Spain was also an opportunity to personally search out a branch of his family roots.

"I'm the youngest of five children, and the only one born in the United States. My parents are of Mexican ancestry. I'm Mestizo, a mix of the Spanish aristocracy and the Native Indians. My family name is Basque. I have a family coat of arms that says that my ancestor was knighted in the 1670's in a town in Spain. On the other side, my grandmother spoke an Aztec dialect."

Roberto grew up in a bicultural, bilingual environment in southern Texas.

"The concept of caring was strong in the culture and the community. Helping people is a part of our culture. People cared for their families and neighbors, helping out when needed. Such caring was an assumption, and a norm. But opportunities to succeed outside of the community were limited."

His family moved to California for Roberto's last years of high school; the move meant better educational opportunities for Roberto. After high school Roberto was awarded a full-tuition scholarship at Stanford.

"I had planned to go to a University of California campus, I had only applied to Stanford

on an outside chance, but it came through. It was too good an offer to turn down. I still had to work for room and board, which was different from most of the students.

"At first the jobs were just in offices, but then I started working in hospitals. One summer job was every pre-med's dream. I started as a go-for, and then worked into other roles. I learned phlebotomy, EGKs, assisted the techs, worked in the lab. I got to do a little of everything and enjoyed it. Especially phlebotomy. I learned about inflicting pain in a gentle manner. It's really something to get a smile out of someone while you're drawing blood. After that I worked as a phlebotomist at the student health center, and one year drew blood every morning from 6:00 a.m. to 9:00 a.m. at the VA hospital."

During Roberto's senior year he became involved in community work. The American Red Cross had translated all of its materials into Spanish, and he was involved in the teaching and implementation of the program at the community level.

"This was an exciting introduction to health education in my cultural language."

Roberto completed school with a double major in microbiology and medical microbiology. Throughout school Roberto felt the active support of his family.

"There was a big fanfare when I graduated. I was the first four-year college graduate in my family, and they were really proud. I'm never alone, everything that I do is with and for my family. And they all share in the accomplishment."

After graduation Roberto took off a year to do research. Earlier experiences in research as an undergraduate he found fascinating: "Like a whole different universe, like watching Lilliputians."

"That year I worked on an animal model of hepatitis with ducks, squirrels, mice, geese, and rabbits. The animal disease is non-infectious to humans, so it was safer to work with. I did everything: I wrote the proposal and the protocols, and I organized the data. I cared for the animals; I was on call at 3:00 a.m. if there was an emergency with any of the research animals. It was interesting work and challenging; I have a deep respect for what research PhDs do, but I decided I didn't want to do research. I missed human contact."

In applying to medical school Roberto chose UCSF for its supportive environment. He feels the faculty is concerned and helpful. Exemplifying this attitude, in helping arrange an opportunity for Roberto to do summer research, the Vice Chancellor personally contacted a colleague in Spain.

Roberto's original plan was a month of interviews with doctors about health policy. When he got to Spain, however, Roberto found there was no functional health policy, only a disorganized bureaucracy.

"The doctors had been on strike for a month, medical students were on strike, and there was a two month backlog on surgery in the hospitals."

Instead of policy research, his mentor in Spain arranged a one week observation with a cardiology resident. Following that, Roberto worked with a cardiac surgeon

"The first day I didn't know what to expect. I scrubbed and watched a valve replacement surgery. The next day I did retraction. After that for three weeks I was the surgeon's first assistant, his third hand during operations. It was my first experience of seeing a heart stopped and started during by-pass surgery, and of touching a live, beating heart. The surgeon was very wise and aware of the inconsistencies of the system. He knew how to get work done and train his own assistants."

Roberto was staying with a medical student and also had the opportunity to help in animal studies, including a study of heart valve calcification done on sheep.

Roberto, like Melissa, noted a very different quality in the doctor-patient relationship in clinical settings.

"There's more respect, in both directions, the patients for the doctors and the doctors for the patients. And no one sues a doctor; you won't find a lawyer who would sue a physician. If there is a complaint, it goes to the medical board and there is a review.

"Doctors have an acute sense of being servants. The patient is viewed as the employer who is paying the wages, not as a case study or an underling. The doctor has something to offer, but the patient may not necessarily desire all that is offered. The patient chooses how much to accept.

"They take a lot more into consideration there, a patient's lifestyle and family. Doctors always ask how the family is affected by a patient's condition.

"I learned a different perspective on medicine, more patient-oriented. Their style of practice is less invasive. Surgery there is a last recourse. Culturally there's more acceptance of death; this means that the medicine is more palliative and less heroic. And their diseases are more complex, for example, they're still seeing sequelae of rheumatic fever.

"Fewer high tech procedures are available, so their diagnostic skills are stronger. They're up on the knowledge, they read the journals but they don't have access to CAT scan everyday. They manage to do more with less equipment; they manage to heal with fewer resources. I appreciate what they do, but on the other hand, it also makes me grateful for the opportunity here to learn advanced technology."

Many of the qualities that Roberto observed in the health care system reflect the culture.

"The Spanish are more low-keyed. They take things in stride. They begin work at 9:00 or 9:30, and close shop at 2:00. There's a strong family concept, the family does something together every day, often a walk in the afternoon. The people walk a lot, and they eat a lot of good food, so in general, they're healthy. But they also smoke a lot.

"The lifestyle is more calm, there's less pressure. People know how to enjoy life, they may have less money, but they pay attention to what they feel is important-- family, time away in the mountains. Right now Spain is having a hard time. Spain takes forever to change, bureaucracy takes a long time. The country was rudely jarred into the 20th century after Franco died. They just joined the Common Market. They recognize that they need to keep up, but culturally they are accustomed to slow change, and it's hard on people."

In travelling around the country, Roberto got to visit the Basque village where his ancestor was knighted. He came back from the summer more calm and peaceful, with a respect for different ways of medical practice. His long-term goals are to work in an under-served area with the Latino population.

"Latinos are a prolific population. The first generation is here now, and we'll be seeing the second generation, their children. By the year 2000 Hispanics will be the largest minority in California. And that year the minorities will be majority in this state. To serve this population, doctors will need cultural skills, not just language."

CONCLUSION

This series of interviews with UCSF students who've done summer research illustrates the power of experiential learning to influence many levels of learning, personal development and career orientations. From the detailed and exacting discipline of the lab bench to grasping the

broad concepts of a health care system in a different culture, these students doing summer research grew personally and professionally. They gained new skills, expanded beyond familiar research styles, and explored different dimensions of the field of medicine. Personally, they deepened in self-confidence; professionally, they broadened their perception of the relations between research and clinical practice.

Students were exposed to many different styles and modalities of research. For some students, learning new skills involved delving into a literature review spanning medical, sociological, and psychological journals. For others it meant addressing in a real situation the ethical concerns and responsibilities of research that involves people. Those students who did summer work in international settings returned to this country with different models of clinical practice and new perspectives in evaluating their own cultural assumptions.

All students found that the skill of asking "the right question," whether for designing lab research or for eliciting information from individuals, is itself an important and learnable art. Though the experiences were varied, students expressed the belief that they had gained a realistic view of research, with its frustrations and stumbling blocks as well as its satisfactions.

Furthermore, it is not just the students who gain from these experiences. By encouraging programs that provide students with opportunities to do research, the University continues to maintain a reputation as a supportive environment and attract academically talented minority students. Such active support of minority students also means the State of California shares in the development of health care providers who reflect more completely the cultural and ethnic diversity of the statewide population. One can also note that the entire profession of medicine gains by engaging rather than alienating these bright students in continuing to make medicine relevant to the needs of all kinds of students and patients.

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